REDUCING FORCED BACKFILL: STAFFING PATTERNS AND CONFIGURATIONS FOR THE ORANGE COUNTY FIRE AUTHORITY EMERGENCY COMMAND CENTER

EXECUTIVE DEVELOPMENT

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that were the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used this language, ideas, expressions, or writings of another.

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Abstract

The problem was the increased frequency in which fire communications dispatchers were subject to forced backfill to ensure the necessary staffing levels for the Orange County Fire Authority (OCFA) Emergency Command Center (ECC).

The purpose of this applied research project was to identify staffing plans that would reduce the frequency of forced backfill and decrease backfill cost while maintaining the appropriate staffing patterns for the OCFA Emergency Command Center along with identifying any modifications that minimized the impact of those forced to duty.

Surveys, interviews and a literature review, utilizing a descriptive research method was incorporated as part of this project that identified the following questions:

1. How are current staffing levels meeting the approved performance standards?
2. What options exist for optimum staffing levels to meet approved performance benchmarks?
3. What are the causes and effects of the increased frequency of backfill assignments for fire communications dispatchers?
4. What scheduling options exist to reduce forced backfill assignments and what other changes should be considered to ease the burden on these employees?

Recommendations made were to add additional needed dispatchers based on research and staffing formulas. Other recommendations included eliminating part-time positions due to a lack of benefit to the research problem.

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Introduction

The Orange County Fire Authority (OCFA) is the largest regional fire service organization in Orange County and one of the largest in California. The OCFA strives for excellence in its commitment to the community and its members. While there is a high degree of satisfaction with the services of the OCFA by external customers, internal customers are more critical of certain problems (Emergency Service Consulting Group, 2000). One of these problems is the increased frequency in which fire communications dispatchers are subject to forced backfill to ensure necessary staffing levels for the Orange County Fire Authority Emergency Command Center (ECC). This condition has resulted in increased backfill costs to the department and poor morale among those forced to duty against their will.

The purpose of this research project was to identify staffing plans that will reduce the frequency of forced backfill and decrease back fill costs while maintaining appropriate staffing patterns and configurations for the Orange County Fire Authority Emergency Command Center along with identifying any modifications that minimize the impact on those forced to duty.

Descriptive research was used to study the present situation and formulate a foundation for a course of action. Descriptive research focuses on determining and reporting the status of a subject at the present time (National Fire Academy [NFA], 2004, p. II-25)

This paper will address the following questions:

1. How are the current staffing levels meeting the approved performance standards?
2. What options exist for optimum staffing levels to meet approved performance benchmarks?
3. What are the causes and effects of the increased frequency of backfill assignments for fire communications dispatchers?

4. What scheduling options exist to reduce forced backfill assignments and what other changes should be considered to ease the burden on these employees?

Background and Significance

Orange County is located in the heart of the Southern California coastline between Los Angeles County to the north, and San Diego County to the south. The County covers 798 square miles with a population of over 2.9 million people. The profile of Orange County includes both high-density urban, as well as rural areas situated in remote canyons. The geographical make-up of the County ranges from a remote undeveloped mountainous region on the east, to forty-two miles of scenic coastline on the west.

The Orange County Fire Authority is a young and unique organization. It was formed in 1995, transitioning from the Orange County Fire Department to a joint powers authority. Although young, the OCFA has experienced rapid growth during its ten-year existence. When formed in 1995, the OCFA consisted of forty-eight fire stations and a headquarters facility that occupied twenty-two different buildings, some of which were originally constructed in the 1940's. Today the OCFA serves the community from sixty-one fire stations with three new stations currently under construction. The headquarters facility has been replaced by a 285,000 square foot, state of the art facility which now includes a department training facility.

The OCFA is an independent organizational entity similar to a special district. The service area includes twenty-two cities, and all of the unincorporated areas of the county. A twenty-four member Board of Directors governs the OCFA. The Board includes an elected official appointed to represent each of the twenty-two member cities and two representatives from the County Board of Supervisors. An appointed Fire Chief who reports to the Board of Directors manages the OCFA.

The Orange County Fire Authority is a combination career and reserve fire department. The OCFA provides a wide range of emergency response services to its customers. In addition to traditional response to fires, the OCFA also provides advanced and basic life support response, hazardous materials response, urban search and rescue, aerial firefighting and rescue, wildland fire response, and others. The OCFA provides these services to a community of 1.3 million residents in a 551 square mile area. On June 30, 2005, the OCFA's authorized staffing level was 1,090 full-time positions. A total of 904 positions or 83 percent of personnel provide front-line services including emergency response, dispatch, and fire prevention. The remaining 186 positions provide technical and administrative support. The OCFA also has 390 authorized reserve firefighter positions (OCFA Comprehensive Financial Report, December 2005).

The mission of the Orange County Fire Authority is to provide the highest quality regional emergency, safety, and support services to our communities (OCFA Way, 2003). To measure the department's success in reaching this goal, in 1998 the OCFA began a customer satisfaction survey program to monitor the level of customer service satisfaction. This survey allows our customer to evaluate our services from the moment they call, through completion of the response. In 2004/2005, almost 33,000 questionnaires were distributed and 10,000 or almost 30% were returned. The OCFA received an overall satisfaction rating of 97% from the community (OCFA Comprehensive Financial Report, December 2006).

The Orange County Fire Authority Emergency Command Center is the initial point of contact for customers seeking emergency services. The Emergency Command Center (ECC) serves as a secondary 9-1-1 answering point and dispatch center for fire and medical emergencies that occur within the OCFA's service area. 9-1-1 calls received at the numerous primary centers throughout Orange County are transferred to the ECC for the dispatch of fire and

medical response. The ECC also serves at the Operational Area Coordinator for fire and rescue mutual aid for all of Orange County. This includes handling requests for mutual aid within Orange County, as well as outside of Orange County and out-of-state requests for assistance.

Directed by a Battalion Chief, the ECC is under the authority of the Operations Department and is one of the sections within the Operations Support Division. The ECC is responsible for dispatch operations, GEO File (Data Resource Support) and Communications Services (Technical). A Senior Supervisor who is responsible to the ECC Battalion Chief administers each functional area.

The total number of authorized positions for the Communications Section is one battalion chief, three senior fire communications supervisors, three shift supervisors, nineteen full-time dispatchers, three part-time dispatchers, two office specialist, three technical support specialists, two mapping and GIS specialist, and one administrative assistant. The level of staffing in the ECC has not increased since 2002.

Personnel assigned to the emergency communications center are responsible for the dispatch of emergency calls. This process includes call taking (receiving information as it relates to location, type of call, and circumstances of the call), providing emergency medical pre-arrival instructions using an Emergency Medical Dispatching program, dispatching (determining and sending the appropriate response and available resources to the call), providing information to all resources within OCFA, and coordinating with other public safety agencies.

The ECC has identified dedicated responsibilities for each position. Personnel are rotated through the various positions. During routine work hours there is always a minimum of one call taker position and one primary dispatch position as well as two tactical dispatch positions and one supervisory position. The call taker and dispatcher responsibilities are well defined with

limited crossover. The tactical positions serve as back-up call takers when necessary. This necessity has continued to increase over the past years. The supervisory position coordinates activities and assists as necessary. The demand on the supervisory position to assist in call-taking activities has also increased (Lori Boyle, Personal Communication, October 10, 2005). During the non-peak periods, staffing at various positions can be reduced and likewise increased during peak periods.

Most of the dispatch employees work at 24-hour shift. The 24-hour shift assures that personnel can be made available in the event that multiple incidents occur or a major incident occurs where additional personnel may be needed. During a 24-hour shift, personnel are allotted one hour for meals and six hours for sleep. The sleeping hours are not paid unless a person is awakened for work purposes. Part-time positions work 12-hour shifts for additional coverage during peak periods and for leave time of the 24-hour shift personnel. Experienced dispatchers work out of class to fill supervisory positions when a supervisor is not available.

The ECC supports a minimum shift assignment of five 24-hour dispatchers, two 12-hour dispatchers, and one 24-hour supervisor for each 24-hour shift. To ensure minimum staffing, constant staffing is maintained through the use of backfill. Constant staffing is defined as the process wherein vacant positions are always filled (Virginia Beach Dept of Emergency Medical Services, 2004). The need for backfill is created by vacant positions when employees call out sick, take vacation, or for training needs. ECC personnel can volunteer for this backfill however, in situations where there are no volunteers, forced backfill is used to maintain minimum staffing levels.

While the staffing levels in the ECC have remained constant, the workload has seen some significant increases. In 2004 the OCFA Emergency Command Center managed a total of

154,732 phone calls. This includes 32,046 9-1-1 calls. In 2005, the number of total calls increased significantly to 225,377 total calls. This is an increase of 45.6 percent. 9-1-1 calls also increased in 2005 to 51,412, an increase of 60.4 percent (Public Safety Network Report, 2005). In 2004, the ECC dispatched 79,913 calls for service at an average of approximately 220 dispatched incidents in each 24-hour period (OCFA Annual Report 2004, 2005). In 2005, the ECC dispatched 82,702 calls, a 3 percent increase. In addition to 9-1-1 calls, the ECC also managed another 122,686 non 9-1-1 calls in 2004, and 173,965 non 9-1-1 calls in 2005, a 41 percent increase (Public Safety Network Report, 2005).

In addition to increased call-load, there has been an increase in other workload issues (Lori Boyle, Personal Communication, January 23, 2005). This includes special mapping projects, entering GEO file data, and training, and in particular, newly added radio traffic from the county's private ambulance companies.

The need to maintain minimum staffing levels behind vacant positions, vacation, sick leave, and training has resulted in a steady increase in the number of ECC personnel subjected to forced backfill. Over the past five years the ECC has seen a steady increase in the number of forced backfills. In fiscal year (FY) 2002/2003 there were 220 instances of forced backfill for dispatchers (7.1 shifts per person, per year). In FY 2003/2004 this number of forced backfills increased to 250 shifts (11.9 shifts per person, per year). In FY 2004/2005 the instances of forced backfill again increased to 267 shifts (13.3 shifts per person, per year) (Jim Mabey, Personal Communication, August 13, 2005). The growth in force overtime has unhealthy social costs (Economic Policy Institute, January 2002). Frequent mandatory overtime is one of the top five factors leading to increased stress, and sixty-two percent of employees who regularly work

overtime shifts find their jobs highly stressful, compared to only 34 percent of employees working regular hours (United Nurses of America [UNA], 2003).

According to Mike LaPean, OCFA Dispatcher and Dispatcher Employee Labor Representative, this situation has resulted in low morale and an increased use of leave time in the ECC (Personal Communication, May 12, 2005). LaPean asserts that in order for ECC personnel to be assured time off, they use leave time to protect themselves from forced backfill (department policy protects an employee from forced backfill when on approved leave). In some cases the employee only uses leave to take a portion of the shift off for protection. According to LaPean (Personal Communication, May 12, 2005), this has created several issues. First, it has produced an environment where the dispatchers do not respect one another enough to be bothered by using leave time to protect themselves from forced overtime. And second, the low morale has caused dispatchers to not identify with their employer as a positive entity. According to the Montana Standard (2004), as morale declines and conflict increases, the current trained, professional, and dedicated employees will look elsewhere for employment where they feel more respected.

While mandatory overtime behind vacant positions may be thought of as a cost saving measure, it often generates very large costs, even if sometimes unaccounted for, in the form of increased turnover (UNA, 2003). The ECC has experienced a steady number of turnovers during the past five years. Since 2000, thirteen employees have resigned from the ECC, or 2.6 employees per year (Lori Boyle, January 23, 2005). This is fifty-nine percent of the total staff in five years, or 11.8 percent per year. This figure is above the national average of ten-percent for government jobs (Association of Public Safety Communications [APCO], 2005).

The consistent turnover rate has resulted in unfilled positions in the ECC. Over the past five years these vacant positions have directly contributed to the frequency of forced backfill.

Even when the positions are filled, it takes approximately one-year to fully train a new dispatcher to operate independently. During that time, they are unable to fill the position of a trained employee and as such, a trained employee must be hired to work in that position, either voluntarily, or by forced overtime.

Official leave use records support LaPean's comments. In FY 2003/2004, 102 (40%) of the 250 forced backfill shifts were a result of employees using sick leave. In this same period 26 (10%) were results of the employee using vacation leave. This constitutes 56% of the forced backfill shifts in FY 2003/2004. In FY 2004/2005, 123 (46%) of the 267 backfill shifts were a result of employees using sick leave and 29 shifts (9.2 %) were a result of employees using vacation leave. This constitutes 56% of the forced backfill in FY 2004/2005. The cost of turnover affects bottom-line performance (Nierman, 2001).

Sick leave use is high in the Emergency Command Center. According to Atkinson (1993) dispatchers will take about three-quarters of their earned sick leave each year. Sick leave use in the ECC is well above this average. Of the 20 dispatchers assigned to the Emergency Command Center have used eighty-nine percent of their earned sick leave. Sick leave use is even higher among those with ten years or more of service in the ECC. For those eight employees, they have used 92.6 percent of their earned sick leave. As of December 31, 2005, of the 20 dispatchers, six do not have enough sick leave to take one entire shift off. Another four dispatchers would be unable to take two shifts off. One of these employees only has a sick leave balance of 1.55 hours. In FY 04/05, sick leave use resulted in forty-six percent of the forced overtime (123 shifts) in the ECC.

Vacation use in the ECC is high as well. Of the eight employees who have worked in the ECC for 10 years or more, they have used 95.13 percent of their earned vacation. Of these eight

employees, as of December 31, 2005, four did not have enough vacation leave to take one entire shift off (one shift requires 17 hours of leave time). One employee has a vacation balance of only 2.5 hours. Atkinson (1993) asserts that most dispatchers will take all vacation earned during a year. However, according to Lori Boyle, ECC shift and staffing supervisor (Personal Communication, January 6, 2006), vacation is not taken in the traditional manner. Boyle stated that out of the twenty dispatchers, only two requested the traditional extended vacation. All other requests are for either single shifts, or more commonly, a portion of a shift. In FY 04/05, vacation leave resulted in nine percent (25 days) of the two-hundred-sixty-seven shifts of forced overtime.

The increase in forced backfill has resulted in additional backfill costs over the past two years. In FY 2003/2004 backfill cost for the ECC was $409,110 for the year. This was twelve percent of the Center's $3,398,297 budget for salaries for that period. Continuing into FY 2004/2005, backfill costs were $417,116. Again, twelve percent of the Emergency Command Center's $3,494,633 budget for salaries during the year (Stephen Hamilton, Personal Communications, October 31, 2005).

In July 2000, the OCFA began a customer centered strategic planning process. This process identified strengths, weaknesses and needs of both the organization and customers. Realistic goals, strategic initiatives, and objectives were established as a result of this process. This Applied Research Project relates to Objective 3-B of the OCFA Strategic Plan. This objective states "Complete a comprehensive long-range staffing plan to ensure the most appropriate staffing patterns and configurations for ECC" (ESCG, 2000).

In light of the events of September 11th, it is now even more important that we recognize that emergency communications centers of our nation are in fact the true "first" of our first

responders (APCO International, 2005). They must process calls for help from unknown and unseen individuals under unusually stressful conditions. The expedient and accurate handlings of these calls for help are significant factors in the successful outcome of any incident (IFSTA, 1998). The dispatcher holds a pivotal role in managing fire incidents and decreasing the potential loss of life prior to the on-scene arrival of trained fire suppression and rescue personnel (Emergency Dispatch, 2005). Both California and Oregon have studied the tasks that public safety dispatchers perform. The California study resulted in a list of 685 dispatcher tasks (911dispatch.com). However, this study found that even more important than knowing how to do the tasks was the work environment where they were performed.

This applied research project (ARP) is relevant to the course work included in the curriculum of the National Fire Academy's Executive Fire Officer Program (EFOP), *Executive Development* (ED), R123 Course (National Fire Academy [NFA], 2005). This researcher noted the following distinct links:

First, *Unit 1: Leadership* summarized (a) the concepts, principles, and practices of adaptive leadership and its relationship to leading others; (b) the concepts, principles, and practices of adaptive leadership and its relationship to the executive fire officer leading themselves; and (c) the need for the executive fire officer (EFO) to recognize from the Leadership Profile how their strength and weaknesses will affect their leadership role in their organization.

Second, *Unit 3: Change Management* which is an ongoing process for the executive fire officer that describes (a) applications of the APIE, the Personal/Psychological, and the Change and Diversity change models; (b) the role of the EFO as a change agent and; (c) the need to recognize diversity as a significant factor in change.

Third, *Unit 5: Change and Creativity* describes the EFO's (a) challenges to leadership creativity; (b) factors which block or reduce the executive fire officer's individual and organizational creativity; (c) the five stages of innovation and creativity and; (d) characteristics of EFOs who encourage creativity.

Fourth, *Unit 7: Organizational Culture and Change* which the EFO will (a) recognize the characteristics of a culture, and specifically their organization's culture; (b) identify indicators which point to a legitimate need for an organization's culture to change; (c) recognize diversity as a significant factor in culture change and; (d) recognize their role as an agent of cultural change.

Finally, *Unit 8: Ethics and Change* where the executive fire officer will (a) implement the concepts of ethical leadership; (b) consider the basis or their organization's values; (c) participate in shaping and reinforcing organizational values; (d) implement morale and ethical decision-making; (e) recognize ethical dilemmas and; (f) accept the challenges of ethical leadership.

This ARP relates to the United States Fire Administration (USFA) operational objective: (1) Reduce the loss of life from fire by 15 percent; and (3) to appropriately respond in a timely manner to emergent issues. The Emergency Command Center plays a vital role in the operational efficiency and timely delivery of fire and emergency medical services to the community. As the first link to getting help, dispatch operations are vital and directly affect response times. An efficient and properly staffed dispatch center will reduce the time between a request for help and the time emergency units arrive on scene. This results in faster care of the sick and injured, and quicker action against fires, keeping them smaller, and thus reducing loss of life to both the community and firefighters.

Literature Review

The purpose of this literature review is to summarize the findings of other research on the problem and answer questions posed in the applied research project. The literature review was organized around the four specific research questions being examined: (1) How are current staffing levels meeting the approved performance standards? (2) What options exist for optimum staffing levels to meet approved performance benchmarks? (3) What are the causes and effects of the increased frequency of backfill assignments for fire communications dispatchers? (4) What scheduling options exist to reduce forced backfill assignments and what other changes should be considered to ease the burden on these employees? A review of relevant literature confirmed the need for this applied research project.

1. How are current staffing levels meeting the approved performance standards?

Staffing communications centers with the number of dispatchers needed to meet established standards is not an exact science (Kless, 2005). The process of estimating staffing needs is full of opportunities to underestimate the true need, to underestimate the amount of time it actually takes to process calls, and to overestimate the amount of time that employees are available to handle calls (APCO, 2005). The staffing levels required in dispatching centers appear to be the product of management experience and judgment rather than a rigorous analysis (Federal Railroad Administration [FRA], 2004). The literature review found this is true of the OCFA as well. In 2002 a modified staffing analysis was completed reviewing telephone workload and incident workload activity. This analysis was compared against other communications operations and was used to determine OCFA staffing requirements (ESCG, 2002).

The National Fire Protection Association (1999) has developed, published and disseminated more than 300 consensus codes and standards intended to minimize the possibility and effects of fire and other risks (NFPA, 2005). One of these standards is NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems, 1999 Edition*. This standard enhances the professionalism of and emphasizes the importance of telecommunicators. This standard establishes guidelines for receipt and processing of alarms. According to NFPA 1221, "Ninety-five percent of alarms shall be answered within 30 seconds, and in no case shall the initial call taker's response to an alarm exceed 60 seconds." (Section 4-3.1[2], p. 1221-12). The dispatch of emergency equipment shall be made within 60 seconds after receiving the notification of the emergency (NFPA 1221, Section 4-3.1[3], p.1221-12).

APCO (2005) found that the service goal most commonly mention for public safety communications centers is to answer ninety-percent of calls within ten seconds. Some 9-1-1 centers strive to answer every call by the third ring. APCO (2005) continued stating that such response goals require an adequate level of staff availability to handle the possibility of a sudden influx of calls. Although most 9-1-1 centers use a recording to tell callers not to hang up, callers assume that a human being will answer the phone and not some form of answering machine. APCO adds that when a caller is experiencing a crisis, the last thing they want to hear is a recording telling them they are being put on hold. Call abandonment rates are a good indicator of whether or not existing staffing levels are comfortably handling the incoming call volume.

The State of California has also developed 9-1-1 standards for public agencies in California. The Department of General Services has released the 9-1-1 Operations Manual. This manual includes both mandatory and non-mandatory standards. In Chapter 1 of the Manual (July 1, 1997), one of the non-mandatory standards state, "During the busiest hour of any shift,

ten seconds should be targeted as the maximum amount of time in which incoming 9-1-1 calls are to be answered (p. 1.2).

The telecommunications and cable service industry has also established standards for service. The City of Shawnee, Kansas created Technical Standards for Customer Service Practices for the providers of cable television and internet services in their city (Standard 14.02.140). This standard requires the cable service, under normal operating conditions, to have a trained technician answer all calls within thirty seconds.

The Orange County Fire Authority has established performance standards and benchmarks for answering incoming phone calls, and for handling time from call receipt to call dispatch. Standard 3-44, states that "All attempts should be made to answer all 9-1-1 calls on the first ring" (OCFA ECC Training Manual). This standard also states that from the time of a call being received, it will be dispatched in thirty seconds or less.

2. What options exist for optimum staffing levels to meet approved benchmarks?

According to a study completed by the Federal Railroad Administration, both dispatcher work schedules and staffing levels can affect overall performance, including meeting established performance benchmarks, as well as safety (2004). Schedules that require rapid rotations and compression of rest days can adversely affect a dispatcher's on-the-job alertness. Inadequate staffing levels may result in excessive overtime and utilization of staff on scheduled days off. In some of these cases, organizations may end up paying premium overtime rates for sub-optimal, fatigued-impaired performance. Over the long term, organizations with staffing issues can end up facing the consequences in the form of health, safety and substandard performance issues (FRA, 2004).

With regards to staffing issues, it is essential to clarify the difference between staffing and scheduling (APCO, 2005). The two concepts are so similar that the line between them is not always clear however, there is a difference. Staffing concerns the number of employees required to do the work, whereas scheduling addresses assigning employees to specific time blocks to match the need (APCO).

While the literature review emphasized the importance of work schedules, the most effective strategy a manager can use to ensure optimum staffing is to improve the retention of dispatchers. This can be achieved by keeping all positions filled (APCO, 2005). APCO (2005) continues stating that understaffing is risky business. It is frequently suggested that lives are put at risk if a communications center is not adequately staffed. The APCO Project RETAINS Committee (2005) discovered a specific incident in Prince Georges County (MD) where a couple had perished in a fire. The Washington Post attributed the deaths to a shortage of 9-1-1 operators.

According to APCO (2005), the strongest and best predictor of a high retention rate is having all authorized positions filled and keeping them fully staffed. During the Project RETAINS study (APCO, 2005), large communications centers were twice as likely to report a scenario of chronic understaffing (a large center was defined as having more than seventy-five employees). The average turnover rates were found to be lower in large centers than in small (1-15 employees) and medium centers (16-75 employees). However, the study found that turnover is almost inevitable in organizations that employ large numbers of workers.

The literature review discovered that public safety communications centers were not the only dispatch centers experiencing staffing and turnover concerns. In a study by the Federal Railroad Administration (2004), they discovered that railroad dispatch centers were also facing

issue with turnover. All six of the railroad dispatch centers that were surveyed were operating with a ten percent turnover rate.

About forty percent of large communications center managers accommodate routine turnover or unexpected employee absences by over hiring (APCO, 2005). While discouraged by most government agencies, the managers who did over hire were more likely to be fully staffed. This allowed their employees to better handle the workload without the unnecessary stress or excessive overtime.

How do public safety communications centers determine the number of staff they need? According to Dispatch Monthly (2005), there is not a standard formula, mathematical or otherwise to answer that question. In too many centers, the process for determining the number of staff needed to do the job appears to be fundamentally flawed, providing inaccurate guidance, and leading directly to employee burnout and high turnover rates (APCO, 2005). Staffing needs can only be determined with a time and task study of your center, and an evaluation of your agency's performance goals (Dispatch Monthly, 2005).

Estimating staffing needs is a combination of art and science (APCO, 2005). On the science side, one of the options for determining optimum staffing levels is the use of formulas. While many agencies use formulas, according to APCO (2005) these staffing calculations are part of the problem. In the Project RETAINS study, over half of large center managers, fifty-six percent, indicated they used a formula to determine the number of call takers and dispatchers they needed. Of those that used a formula, twenty-seven percent used call volume calculations, and eight percent figured average calls per hour. Fifteen percent of large center managers used Erlang C calculation to estimate their staffing needs. One if five used a shift relief factor; and

forty percent indicated they calculated employees' available work time. Twenty percent conducted a work analysis to determine their staffing needs (APCO, 2005).

According to the Federal Railroad Administration (2004), the optimal staffing level for any dispatching operation is a function of both the number of dispatcher positions that must be staffed and the extent to which someone other than the regularly assigned person works each position. The method recommended by the FRA is based on the average number of positions required over a week, and the average level of absenteeism for the center. It is still possible that, due to unusual circumstances on a given day, there may be a need for someone to work on a regularly schedule day off (FRA, 2004).

One option used by commercial call centers to determine staffing and scheduling needs are Erlang formulas. According to APCO (2004), Erlang formulas are considered the standard for any process that requires an application of queuing theory, such as nonlinear arrival times of incoming calls in a dispatcher center. The Erlang formulas use a statistical solution that addresses the randomness of call arrival times however; the formulas are very complex and often intimidate people who do not have a science or engineering background (APCO, 2005).

Another option for determining center staffing is the basic formula (APCO, 2005). This formula works on the principle of balance. This process looks at the amount of work required in the center, and the number of workers available to perform the work. The balancing portion comes into play by either reducing the work if it exceeds the ability of the number of workers, or by increasing the number of workers if the workload is excessive.

The basic formula calculates the number of dispatchers required to cover a specific number of consoles. However, it does not identify the number of personnel required to handle the call or workload volume. The basic formula suggests six steps. These are:

Step 1: Identify the type of position you wish to analyze.

Step 2: Determine employee availability.

Step 3: Determine your turnover rate.

Step 4: Select the appropriate formula and analyze all positions.

Step 5: Compare the number of staff you have with the number you need.

Step 6: Do a reality check.

In small communications centers, this process may only require a single calculation. However, in large centers, this will be an interactive process, working through the calculations for each separate position, and then adding it all together in a summary report that compares current staffing levels with the estimates provided by the calculation (APCO, 2005).

APCO (2005) also identifies a third option for determining staffing levels called volume-influenced positions. The number of employees required to staff volume-influenced positions is determined by measuring of the overall activity level in the center, and the number of individuals scheduled to handle that workload on any given shift is determined by the workload for that shift. There are other factors that influence volume-influenced positions to consider. While this method still uses a formula to calculate work on one side and workers on the other side, the work is defined by the amount of work, not the number of hours that the positions or consoles are covered. The basic formula for volume-influenced positions is Full Time Employees (FTE) = workload ÷ employee availability x turnover adjustment (APCO, 2005).

In large communications centers both the call taker and call taker/dispatcher position are often volume-influenced positions where staffing is influenced by phone activity. Situations that require increased staffing to handle special events such as weekends, or holidays, and are

typically handled with overtime and might be considered volume-influenced scheduling, but not volume-influenced staffing.

According to APCO (2005), there will always be questions about the number of dispatchers needed to cover the phones and handle the call volume. All of the formulas for estimating staffing needs are filled with opportunities to underestimate the number of people needed, underestimate the time it actually takes to process calls, and overestimate the speed in which dispatchers can handle calls.

3. What are the causes and effects of the increased frequency of backfill assignments for fire communications dispatchers?

According to APCO (2005), one of the clearest causes of increased backfill is that the current staffing level is unable to handle the current workload. If a center is adequately and properly staffed, there will be no need for regularly scheduled mandatory overtime to handle the workload. When a facility is unable to meet its minimum staffing requirements, then they are forced to utilized mandatory overtime (Association of Federal Government Employees [AFGE], 2004). The AFGE (2004) goes on to ask, "The practice of mandatory overtime begs the question of just how many consecutive hours can an employee be required to work and still perform their duties safely and effectively without posing a risk to themselves or others?"

While the use of mandatory overtime should be reserved for only true emergencies, some employers rely on it as a regular means of staffing (Worthington, 2001). Worthington (2001) continues asserting that while this ill-conceived strategy is meant as a solution to staffing deficits, it actually creates more problems. While this growth in overtime work may be helping to drive the healthy growth in output of the U.S., it also has unhealthy social costs (Golden and Jorgensen, 2002). It is taking its toll not only on workers, but on their families, communities,

and ultimately in many cases on customers and employers. Families burdened with longer work hours are more likely to find it difficult to balance the conflicting demands of work and family. More hours at work mean less time with family, less time to help a child with homework, less time for play, and less time for sleep. Golden et al. (2002) found that these sacrifices can translate into increased risks for accidents, greater chronic fatigue, stress, and related diseases; reduced parenting and family time; and a diminished level of service to the customer at work – a serious public concern especially in the public safety sector.

Beyond the simple negative effects of overtime work in general, additional problems mount when overtime is imposed against an employees will (United Nurses of America [UNA], 2003). Overtime, and in particular forced overtime without advanced notice, is a challenge to working families. Being told at the end of a shift to stay and work another shift can leave working parents- especially single parents – scrambling to make arrangements for childcare at the last minute (Golden et al., 2002).

Long hours can be detrimental to workers, their co-workers, their families, and the public (Golden et al., 2002). There is evidence that despite the short term benefits that make overtime attractive to employers, it may in the longer term create offsetting harm to an organization by decreasing quality, increasing mistakes, and reducing productivity (Golden et al.). Further, frequent overtime and long work-days can be a major cause of stress and chronic fatigue reported by many workers, as well as the ensuing burnout and serious health conditions. Worthington (2001) asserts that while fatigue remains difficult to define and measure, there is a complex relationship among the three main variables associated with accidents and fatigue, namely overtime, shift work, and the type of work performed.

Directly related to a cause of fatigue, Golden et al. (2001) asserts that overtime often comes at the expense of sleep. When workers cut back on sleep, their work performance suffers. A study conducted by the American journal of Public Health in 1992 found that nurses in Massachusetts who work variable schedules and mandatory overtime shifts were twice as likely to report an accident or error and two-and-one-half times a likely to report near-miss accidents (MassNurse News, 2000).

Involuntary scheduled overtime work may further worsen the negative well-being, safety and health outcomes of employees and overall job satisfaction (Golden et al., 2001). Job dissatisfaction can also prove costly for fire departments (Cochran, 2006). Cochran asserts that misery loves company, and that dissatisfied personnel encourage dissatisfaction in others. Work ethic suffers when employees aren't satisfied with their jobs. Violence, sabotage, a desire to quit and absenteeism are generally associated with employees where low morale festers. Poor morale impacts productivity, which in turn impact overall operations (Executive Management Consulting, 2003). When morale is low, Cochran (2006) contends that customer complaints increase, employees turn on one another, and they place the blame on the shoulders of the department's leadership.

As morale declines and conflict increases, employees will look elsewhere for jobs where they feel more respected and valued as employees (Montana Standard, 2004). Losing employees can have a tremendous detrimental impact to the department. Employee turnover is an enormous problem for any organization and creates a negative impact (Goolsby, 2005). What's more, About –Business (2005) states that in addition to the costs of recruiting new employees, turnover also negatively impacts organizations by lost productivity, and decreased accuracy and quality of work among the employees left behind.

4. What scheduling options exist to reduce forced backfill assignment and what other changes should be considered to ease the burden on these employees?

According to Dispatch Monthly (September, 2005) there are many ways to configure shifts in a communications center. However, all the possibilities revolve around several standard issues:

1. Each dispatcher must work only 40 hours in any given calendar week to avoid paying overtime under the Fair Labor Standards Act (FLSA).
2. Each dispatcher must have days-off according the any applicable laws and union agreements.
3. There must be sufficient staffing on each day to perform essential tasks, taking into account variations in activity by hour of day and day of the week.
4. The staffing must take into account the usual absence rate, including sick leave, vacation and other leave.
5. To some extent, you must take into account the desires and wishes of the employees on the way shifts and days-off are configured.

There are several options for shift configuration. These include the 8-hour, 10-hour, 12-hour and 24-hour shift. There are also variables of these options that combine 4, 8, and 12-hour shifts (Dispatch Monthly). While there are many options, the 8-hour shift is still the most common; it was reported by forty-nine percent of the centers in a study conducted by the Association of Public Safety Communications (1999). Ten percent were using 10-hour shifts, and only three percent were using 12-hour shifts. The other thirty-eight percent were using unique scheduling configuration designed to fit there needs and employee preferences, including

24-hour shifts. The 24-hour shift is more common among fire dispatching centers, but it requires some type of sleep-rotation schedule and facilities.

Moving beyond the basic 8-hour shift increases scheduling complexity but it appears to be worth the effort (APCO, 2005). Several centers have experimented with shift lengths different from the ones they currently used. APCO (2005) contends that the option of longer shifts appears to be attractive to many employees. As with all choices however, there are costs and benefits. While with longer shifts the workday is long, the opportunity for employees to get away for longer periods is beneficial.

Another scheduling option is peak-loading. This means adjusting staffing patterns to match expected increases in activities, or special event driven events. During these periods additional personnel can be available to handle the increased workload (Reason Foundation, 2005).

The literature identified other options that could positively impact forced backfill assignments. APCO (2005) asserts that the increasing workload should be considered in decreasing the burden on employees. While most managers reported an increase in the workload in their centers over the past years, most indicated the staffing levels in their centers had remained the same. They indicated increases in total call volume, the number of emergency calls, wireless calls, and dispatches. The literature raises the question whether these busy centers are using employee time more efficiently or diminishing the safety margin that permits them to handle unanticipated surges in call activity. As centers operate closer and closer to their maximum call handling ability, what happens in the event of a disaster (APCO)?

The optimal staffing level for any dispatching operation is a function of both the number of dispatcher positions that must be staffed and the extent to which someone other than the

regularly assigned person works each position (FRA, 2004). One of the first options in ensuring this optimal staffing level is to keep the communications center fully staffed (APCO, 2005). The safety of the personnel in the field and of the citizens served depends on the center's ability to maintain adequate staffing levels and keep all authorized positions filled. In some organizations, positions that go unfilled are viewed as expendable, especially during tight budget times. Even if the current staffing levels do not meet the needs of the center, the manager should hire to the authorized level before asking for additional staff.

Hire enough staff so that the employees can comfortably handle the workload. Trends have indicated an increase in the workload for communications centers, in particular due to an increase in wireless calls (APCO, 2005). Staffing levels should be sufficient enough to handle a sudden influx of calls. Communications centers should keep vacancies full by hiring proactively. This prevents the center from having to constantly play catch-up.

If your center is fully staffed but still working at capacity, or if your employees are averaging more than eight hours of overtime each month, another option that exists is to add employees (APCO, 2005). The addition of a single employee can make a huge difference in employee stress and the quality of service provided. In a busy center, the number of dispatchers available to handle the workload can make a substantial difference in response times (APCO). Studies conducted by the Association of Public Safety Communications (2005) have demonstrated that the addition of even one person can dramatically improve the average speed of answering a call in a communication center that is understaffed.

Once a center is adequately staffed, every effort should be made to keep the staff you have. Effective management practices should provide the direction and support that the employees need. Keep salaries competitive and in-line with other public safety agencies (APCO,

2005). While competitive salaries are important, creating an environment where the employees maintain a high level of physical and mental energy toward their job will count most (Henning, 1995). When employees do not find stimulating or challenging or fulfilling experiences at work, they begin to focus on other factors. An effective communications center manager will keep people involved thus stimulating their interest and satisfaction in their jobs (Henning).

In summary, the literature review provided findings from other research that supports the problem with increased forced backfill in the Orange County Fire Authority's Emergency Command Center. The literature also emphasized the importance of appropriate staffing levels, reiterating that adequate staffing levels ensure public safety through improved service in the center. Adequate staffing levels also support employee retention and satisfaction when employees are not repeatedly forced to work against their will. This improves employee morale, overall performance, and attendance.

While the research presented various formulas that may be used to determine staffing levels, it also emphasized that there is no one easy way to calculate the true number of employees needed to handle the workload in a communications center, just as there is no easy way to find people who can be successful call takers and dispatchers. The processes presented in the literature take time and effort. The formulas presented are designed to offer flexibility, but each center must figure out how to adapt or apply them to their particular situation.

Procedures

This applied research project used the descriptive method in gathering information on options that would result in a reduction of forced backfill and backfill cost in the OCFA Emergency Command Center. The descriptive methodology focused on studying the current situation and providing recommendations for options to affect the future.

The first part of this research project began with a review of existing literature. Literature searches were promptly conducted at the National Emergency Training Center's (NETC) Learning Resource Center (LRC) in Emmitsburg, MD during the researcher's attendance in the Executive Development, R123 course in July of 2005. The LRC was selected as a beginning due to the enormous collection or periodicals and texts related to emergency services. Additionally, the LRC provides an extensive archive that contains previous works from current and former Executive Fire Officer Program (EFOP) students.

Unfortunately, due to the unique topic of this ARP, the research from the LRC provided very few results. The researcher used the LRC catalog and searched by typing in "communications centers", "dispatch centers", "staffing", "fire communications", and various combinations of these and found no journal articles and four applied research papers. Unfortunately, none of the applied research projects were related to the topic being researched.

A comprehensive search for related information was conducted on the Internet. Several search engines were utilized. These include google.com, excite.com, lycos.com, and yahoo.com. This search revealed an array of articles. Many of these articles were very beneficial in researching staffing options, the importance of proper staffing, the impacts of improper staffing, and formulas for evaluating staffing levels. The researcher also sought literature and journals on dispatching operations outside of the fire service. This produced information from law enforcement, emergency medical services, cable services, and the railroad industry.

Internal OCFA publications and report systems were accessed for statistical data. This includes the OCFA Annual Report 2004, the 2005 Comprehensive Budget Report and the Orange County Fire Way. Telephone and 9-1-1 call data was obtained through the SBC Pacific Bell Public Safety Network. The OCFA utilizes SBC's Frame Relay Network Information

System or FRNIS, to track telephone workload and performance records. Data collected by the researcher in included data on 9-1-1 ring times groups (Table 1 & 2), 9-1-1 call duration groups (Table 3), an All Call summary for 2004 and 2005, which include statistics on 9-1-1 calls, 9-1-1 abandoned calls, and administrative calls (Table 4). Data was also collected for 2004 and 2005 on calls per hour (Table 6). This information can be obtained at http://www.pb911mis.com. Access to the Public Safety Network data is confidential and proprietary and requires a password.

Based on the data collected in the literature review, and the internal information systems of the OCFA, the researcher used the staffing calculation tools available in the research documents. The first of these include the worksheets in the APCO Staffing and Retention in Public Safety Communications Centers Staffing Workbook (2005). The worksheets used include the Staffing Estimation Worksheet A, Determining Employee Availability (Appendix A), Staffing Estimation Worksheet B, Calculating Average Turnover Rate (Appendix B), and Staffing Estimation Worksheet C, Calculating Staffing for Coverage Positions (Appendix C). These worksheets provided an estimate of the staffing needs based on the data discovered during the research.

The researcher also used the Erlang program to estimate call-taker staffing. The tool used was the Erlang on the web program found at http://www.ansapoint.com/calculator (Table 5). Both of these programs allowed the researcher to input the data obtained during the research and arrive at recommended staffing levels.

The author also conducted research at the Dana Point Public Library in Dana Point, California. While this literature review did not produce any journal articles, magazines or texts

directly related to the topic, it did provide information issues that are symptomatic to the research topic.

The second part of the research process included a survey of the fire communications dispatchers assigned to the ECC (Appendix D). The problem identify in the introduction of this ARP is the increased frequency in which fire communications dispatchers are subject to forced backfill. One of the conditions which has resulted from this is the increase in forced backfill and impact this has had on morale among those forced to duty against their will. A symptom of this has been an increase in the use of sick leave and vacation among the dispatchers. The purpose of the survey was to substantiate or contradict this assertion. Using only yes or no answers, the survey asked these questions:

1. Do you work more overtime than you wish?
2. Do you believe the frequency in which you are subject to forced overtime has impacted your morale?
3. Do you use sick leave for an entire shift to protect yourself from forced overtime the following day?
4. Do you use sick leave to go home during a shift to protect yourself from forced overtime the following day?
5. Do you use vacation time for an entire shift to protect yourself from forced overtime?
6. Do you use vacation time for a portion of a shift to protect yourself from forced overtime?
7. Would you stop using sick leave and vacation to protect yourself from forced overtime if the likelihood of forced overtime was significantly reduced?

The survey was developed on both the assertion made in the problem statement of this applied research project, and information learned in the literature review. The survey was hand delivered to the Emergency Command Center on August 20, 2005 by the researcher and placed into each individual's mailbox with a cover letter, and a self-addressed envelope to the researcher. The cover letter explained the purpose of the survey and emphasized the confidentiality of their response.

Due to the smaller number of dispatchers, the survey was distributed to all twenty-two dispatchers. This included the fifteen 24-hour dispatcher, the four 12-hour dispatcher, and three part-time dispatchers. Of the twenty-two people surveyed, eighteen responded.

Interviews were the final source of information and were conducted in person with the primary supervisor in the Emergency Command Center. These individuals were selected due to their leadership role in the center, and their availability to the researcher. The purpose of the interviews was to validate other findings in the review of the literature and data. These interviews were held in each individual's offices on the following dates and times:

Senior Fire Communications Supervisor	January 10, 2006 at 1430 hours
A-shift Fire Communications Supervisor	January 10, 2006 at 0900 hours
B-shift Fire Communications Supervisor	January 14, 2006 at 1100 hours

The questions asked of the supervisors were as follows:

1. Has the use of sick leave and vacation negatively impacted the ECC?
2. Do you feel the current level of staffing is able to meet the current workload?
3. Does the current workload prevent the dispatchers from performing other tasks?
4. Does routine training have a negative impact on the center's ability to operate?

All three interviews were completed following the literature research by the author. There was an assumption by the researcher when conducting these interviews. The interviewees were all aware of this applied research project. The assumption was that all the interviewees were supportive of this ARP and its potential for reducing the frequency of forced backfill in the Emergency Command Center.

This research project has three limitations. The interview process has a high probability of bias. Those interviewed would fall into what is described as convenience sampling (Borg & Gall, 1989). They were those who could be contacted and were willing to answer the questions.

The second limitation was the primary focus of the research literature. Much of the previous research and data on communications centers pertains to Public Safety Answering Points (PSAP). The activities of PSAP are somewhat different than those of a fire communications center for a large fire department.

The third limitation on this research was the six-month time frame during which the research was being conducted. Much of the ability to collect telephone performance data in the Emergency Command Center had not yet been fully accessible. This resulted in a delay in obtaining information critical to measuring the performance of the staffing levels. One other limitation related to the six-month time frame was the impacts of Hurricane Katrina. Response by the researcher in responding to this horrific disaster impacted research project time frames.

Definition of terms:

All Calls – includes all 9-1-1 calls and administrative calls into the communications center.

9-1-1 Calls- calls coming into the communications center on a 9-1-1 line from a PSAP.

9-1-1 Abandoned- calls coming into the emergency communications center that were not answered because the caller disconnected prior to the line being answered.

Admin Calls – all calls, including inbound and outbound on a standard seven-digit phone line.

Admin In- calls into the emergency communications center on a seven-digit phone line.

Admin Out – calls made out of the communications center on a seven-digit phone line.

Calls per hour – the total number of all calls in a given hour for the year.

Call duration groups – the length of time the phone line was in use. The data is grouped in time measurements of 0-30 seconds, 31-60 seconds, 61-90 seconds, 91-120 seconds, 121-500 seconds, and over 501 seconds.

Ring time groups – the length of time from when the line started ringing until it was answered. The data is grouped in measurements of 0-5 seconds, 6-10 seconds, 11-30 seconds, 31-60 seconds, 61-120 seconds, and over 121 seconds.

Results

The results of the procedures employing a comprehensive literature review of public and private sources, internal information sources, surveys, and interviews provided answers to the individual research questions. Detailed findings are provided in narrative form below for each of the survey questions.

1. How are current staffing levels meeting the approved performance standards?

The research clearly demonstrated that regardless of the nature of the communications center, estimating staffing needs proves to be very challenging. Many centers have relied upon the reasoning of management rather than a factual analysis of the workload. This is also true of the OCFA. Even when processes are used, they commonly underestimate the actual staffing needs of the center. The research concluded that staffing communications centers is not an exact science.

There are a variety of performance benchmarks or standards for communications centers. These standards focus on the amount of time needed to answer an incoming 9-1-1 call, and then the amount of time required to transmit the call to the emergency units. Standards exist not only for public safety dispatch centers, but also for the telecommunications and cable service industry. One of the most recognized sources for standards in the fire service, the National Fire Protection Association, has established standards for the receipt and processing of alarms. Their standard calls for ninety-five percent of alarms to be answered in thirty seconds, and in no case should it require longer than sixty seconds to answer.

There are standards more demanding than those established by the NFPA. The State of California developed 9-1-1 standards for public agencies in California. This standard states the maximum amount of time in which an incoming 9-1-1 call should be answered during the busiest hour is ten seconds. The Association of Public Safety Communications also found that the most common service goals for public safety communications centers is to answer ninety-percent of calls within ten seconds. The OCFA has also adhered to the standards of the communications profession, and established a standard to answer 9-1-1 calls on the first ring and dispatch them within thirty seconds or less.

The duration of the ring time is reflected in seconds. The following two tables represent the ring time for 9-1-1 calls for 2004 and 2005:

Table 1

2004 Ring Time Groups for 9-1-1 Calls						
	Seconds					
	0 to 5	6 to 10	11 to 30	31 to 60	61 to 120	Over 120
Calls	27,911	3,866	241	12	5	11

Although the OCFA standard is more restrictive than most, the data from the SBC Pacific Bell Public Safety Network indicates that the objective is being met.

This table represents a total of 32,046 9-1-1 calls. The average answering time for this period is 3.36 seconds. Well within the OCFA standard and far below the national standards.

Table 2

2005 Ring Time Groups for 9-1-1 Calls						
	Seconds					
	0 to 5	6 to 10	11 to 30	31 to 60	61 to 120	Over 120
Calls	38, 911	11,655	715	62	14	55

Table 2 represents a total of 51,412 9-1-1 calls. This is an average answering time of 4.13 seconds. This is an increase of .77 seconds over 2004 calls. The number of total 9-1-1 calls also increased in 2005 by 19,366, or 60.4 percent.

Workload, and thus the impact on meeting performance benchmarks are also impacted by the length of time the dispatcher is on the phone with the caller. This time is most impacted when providing pre-arrival medical instructions, or emergency medical dispatching. The duration of the calls is reflected in seconds. The table below reflects call duration for 9-1-1 calls in 2004 and 2005.

Table 3

2004 - 2005 9-1-1 Call Duration Groups						
Year	Seconds					
	0-30	31-60	61-90	91-120	121-500	500+
2004	2,717	8,078	6,795	5,654	8,641	241
2005	3,497	13,026	11,719	9,197	13,732	241

While there was a significant increase in the number of 9-1-1 calls from 2004 to 2005, the actual average duration of a 9-1-1 decreased in 2005. The average duration for a call in 2004 was 137.85 seconds, or 2.29 minutes. In 2005 this average was 132.25 seconds, or 2.20 minutes.

Researched conducted on data from the SBC Pacific Bell Public Safety Network also provided additional call workload data. The table below represents statistics on total calls, 9-1-1 calls, abandoned 9-1-1 calls, and administrative calls.

Table 4

2004 - 2005 Call Summary				
	All Calls	9-1-1 Calls	9-1-1 Abandoned	Administrative
2004	154,732	32,046	68	122,686
2005	225,377	51,412	6	173,965

This chart reflects a significant increase in total call load. In 2005, total calls increased by 70,645, and increase of 45.6 percent. Administrative calls increased by 51,279 calls in 2005, or 41.7 percent. There was also a significant decrease in abandoned 9-1-1 calls.

While the OCFA Emergency Command Center is meeting their approved performance standards, the research demonstrated that the workload is increasing. The increased workload is beginning to impact the 9-1-1 ring times, and effect the length of time that the dispatcher may remain on the phone with the caller.

2. What scheduling options exist for optimum staffing levels to meet approved performance benchmarks?

The research emphasized the impacts that schedules and staffing can have on performance. Excessive overtime can adversely impact the dispatcher's ability to perform safely. Additionally, this excessive overtime cannot only result in increased costs, but paying higher dollar for sub-standard performance which can ultimately impact safety. The researcher reviewed dispatching errors and their relationship to work schedules, but the findings were inconclusive. There were some relationships noted between dispatching errors and the length of time an employee had worked, but the data did not support a pattern.

While the research identified the importance of work schedules, the most effective option that a communications center can take to ensure employee retention is to make certain that all vacant positions are filled. The research found the OCFA to be no different than other communications centers in the area of turnover, experiencing the loss of thirteen employees in the last five years. Public safety dispatch centers are not the only dispatch centers experiencing staffing and turnover challenges. Other industries such as the railroad have experienced the same staffing challenges.

One option recommended in the literature to meet the challenges of both routine and unexpected turnover is over hiring. While many large centers use this practice, especially in the private sector, it is often strongly discouraged in most public agencies due to the potential perception of tax-payers.

While there is no one standard formula for determining the staffing needs of a communications center, there are options for identifying optimum staffing levels to meet the performance standards for the Emergency Command Center. While formulas do exist, many centers use inaccurate methods and the results are understaffing. This contributes directly to short staffing, burnout, and increased turnover. Actual staffing needs are best determined by conducting a time and task study of the communications center, and an evaluation of the agency's performance standards and service goals.

Determining staffing requirements is an application of both art and science. On the scientific side are staffing formulas, and while many agencies use them, they can result in an outcome that fails to meet the needs of the center. One very scientific formula is Erlang formulas. They are often used by large commercial centers and are considered the standard for any process that requires the application of queuing theory. Erlang formulas use a statistical

solution that considers the randomness of incoming calls. However, they measure only telephone calls, not radio communications required by a dispatch center. Although 9-1-1 calls centers do experience random call arrival times, most centers don't use Erlang formulas because they are very complex and intimidating.

Although Erlang calculations only address telephone activity, the researcher entered the call data from 2005 into the Erlang calculator found at http://www.ansapoint.com/calculator. The data entered into the calculator were the average overall calls per hour (25.72), the average duration for all calls (94.41 seconds or 1.57 minutes), and the allowed average delay in answering the call (5 seconds). This table reflects the results:

Table 5

Erlang C Calculator			
Calls per hour	Call Duration	Average Delay	Agents Needed
25.72	94.41 seconds	5 seconds	3

This chart indicates a need for three call taker positions. The OCFA normally operates with only one call taker with other dispatcher positions assisting as needed.

Another option researched for determining staffing levels in dispatch centers is the basic formula. The basic formula calculates the number of dispatchers to cover a specific number of consoles. It does not however calculate the number of dispatchers required to handle the call or workload volume. The process utilizes three worksheets. The first, Staffing Estimation Worksheet A (Appendix A), determines the hours an employee is available to the center. The second, Staffing Estimation Worksheet B (Appendix B), calculates average turnover rate for the center based on previous data. The third is the Staffing Estimation Worksheet C (Appendix C), which calculates staffing for coverage the positions using data from worksheets A and B.

Table 6

Determination of Net Available Work Hours

Determine Net Available Work Hours (NAWH)		
A	2080	Total hours for one full time employee
B	110	Average vacation and holiday leave (total hours)
C	87	Average sick leave (total hours)
D	0	Average personal leave (total hours)
E	0	Average training leave (total hours)
F	0	Average military, FMLA, etc. leave (total hours)
G	360	Average lunch and break (total hours)
H	0	Average other (meetings) light duty, special assignments, etc)
I	557	Total unavailable time = Total B through H
J	1523	Net Available Work Hours (NAWH) = A – I
	1523	Net Available Work Hours (NAWH) from J above

Table 7

Calculation of Average Turnover Rate

		Year					
Calculate Average Turnover Rate		2001	2002	2003	2004	2005	Average
A	Total number of employees at the highest staffing level of that year	18	18	18	19	20	18.6
B	Number of new hires that failed to complete the probation period	0	0	0	0	0	0
C	Number of experienced employees who left.	2	3	3	3	2	2.6
D	Turnover Rate (Turnover = B = C ÷ A)	0.111	0.166	0.166	0.157	0.1	0.14
E	Retention Rate (Retention = 1 - Turnover) x 100	88.9	83.4	83.4	84.3	90	86

Table 8

Estimation of Staffing Needed for Coverage Positions

Estimate Staffing Needed for Coverage Positions		
Note: Coverage positions must be covered regardless of call volume of level of activity.		
Position: All Consoles		
Hours needing coverage:		
A	5	Total number of consoles that need to be covered for this position.
B	24	Number of hours per day that need to be covered.
C	7	Number of days per week that need to be covered.
D	52	Number of weeks per year that need to be covered.
E	4368	Total Hours needing coverage = A x B x C x D
Employee Availability:		
F	1523	Net Available Work Hours - enter average NAWH from worksheet A
Staff Needed:		
G	28	Full Time Equivalent base estimate (FTE) = E ÷ F
H	0.13	Turnover Rate - from retention worksheet, convert to decimal
I	31.9	Full Time Equivalent required to accommodate turnover, prior to any adjustments based on quality indicators : FTE = G x (1 + H)
31.9 = Estimated Staffing Need (in FTEs from Step I above)		
FTE = Hours needing coverage ÷ Employee Availability x Turnover Adjustment		

The calculations using this method and these three table identifies the need for twenty-eight employees to cover the five consoles currently staffed by the five 24-hour dispatchers in the Emergency Command Center. This table also recommends 31.9, or more accurately 32 employees to accommodate for turnover. The turnover calculation is based on actual historical turnover in the ECC.

Another method discovered during the research is the volume-influenced method. This method measures the overall activity level in the center and the number of employees needed to handle that workload. This method was not used for calculation by the researcher since the data needed to calculate the workload is not available through the OCFA data collection mechanisms.

While the research discovered options for determining staffing levels, the literature also acknowledged that these staffing formulas are filled with opportunities to underestimate the actual need for personnel. The results of the research are, that regardless of the system used, the use of a system or formula alone will always have the prospect that the numbers may not fill the actual need.

3. What are the causes and effects of the increased frequency of backfill assignments to fire communications dispatchers?

One of the issues that arise when workers are subject to mandatory overtime is how many hours can an employee work and still perform their duties effectively, and more importantly, safely. The use of mandatory backfill is intended to be for emergency situations, but the research demonstrated that the OCFA has to rely on mandatory overtime to meet daily staffing levels.

Mandatory overtime has a negative impact on fire communications dispatchers assigned to the ECC. One of these impacts is on morale. In the survey conducted by the researcher, the impacts of mandatory overtime reflected not only employee morale, but also in the manner both sick leave and vacation are used. This survey supported other findings in personal interviews that described an apparently endless cycle of employees using leave time, and their co-workers being subjected to mandatory overtime to fill those vacancies.

Feedback from the survey of fire communications dispatchers is as follows:

1. Do you work more overtime than you wish?

Yes	15
No	3

2. Do you believe the frequency in which you are subject to forced overtime has impacted your morale?

Yes	17
No	1

If yes, positively or negatively

Positively	0
Negatively	17

3. Do you use sick leave for an entire shift to protect yourself from forced overtime the following day?

Yes	14
No	4

4. Do you use sick leave to go home during a shift to protect yourself from forced overtime the following day?

Yes	14
No	4

5. Do you use vacation time for an entire shift to protect yourself from forced overtime?

Yes	11
No	7

6. Do you use vacation time for a portion of a shift to protect yourself from forced overtime?

Yes	16
No	2

7. Would you stop using sick leave and vacation to protect yourself from forced overtime if the likelihood of forced overtime was significantly reduced?

Yes	14
No	2
Not Applicable	2

The survey was consistent with both sick leave and vacation use patterns, as well as with behaviors described in personal interviews. A hand written note on one particular survey returned also emphasized the survey results. It stated:

> "I realize the issue of forcing is inherent with the job, however, the frequency of its occurrence here in ECC is overwhelming! It occurs as often at 2- 3 times a month and is too much! We can't plan anything on our time off. We end up taking vacation time, ½ shift or more to protect our days off. The current management's reaction so far is negative. They say "Go work at Metro Net if you don't like it." I think that's a terrible position for management to take and morale is at an all time low."

The comment is reflective of the low morale caused by the frequency of forced overtime. The research on turnover supported the findings in the literature on poor morale. It emphasized as morale declines, conflict increases and eventually employees begin looking for jobs elsewhere.

The researcher conducted personal interviews with two of the shift supervisors, and one senior supervisor in person. The first question asked was “Has the use of sick leave and vacation negatively impacted the ECC?

Senior Fire Communications Supervisor replied:

“Yes, the level of sick leave use and vacation is very high. The dispatchers are constantly using leave to go home in the middle of a shift. While they deny that it’s to protect themselves, everyone knows that’s what it’s for”.

A-Shift Supervisor Replied:

“Yes, it’s a huge problem, just look at the number of times someone calls in and they don’t even have enough time to cover it. It’s like a cycle. It’s gotten to where no one cares if they mess up the person on the other shifts plans…..it’s gotten to where it’s all about them.”

B-Shift Supervisor Replied:

“Yes. Sometimes you’ll get two or three people call in sick for the same shift. One big challenge is when a dispatcher goes home in the middle of a shift. Because of how often they’re forced, no one answers their phone at home so it’s almost impossible to get someone. We just end up running short.”

The second question asked was “Do you feel the current level of staffing is able to meet the current workload?

Senior Supervisor Replied:

“As long as nothing major happens, yes. If we get any kind of fire or major incident, or if it just gets really busy, then we have to call people back onto the floor from their breaks.”

A-Shift Supervisor Replied:

"Sure, as long as nothing happens. Any kind of major incident or when it gets busy, like when it rains a lot, and we have to interrupt people's breaks and meals."

B-Shift Supervisor Replied:

"Yes, but if anything happens we need the extra people and they end up getting called back from their breaks. We haven't had any additional positions added in four years and it just keeps getting busier and we're doing more and more things for customer service."

The third question asked was "Does the current workload prevent the dispatchers from performing other tasks?"

Senior Supervisor Replied:

"Yes, it does. When I was on the floor you use to be able to ask one of the dispatchers to do a special project, now that's really hard."

A-Shift Supervisor Replied:

"Yes, and not only is the workload more so it's harder to have them off the floor, but with the morale low because of all the forces, no one wants to take on anything extra anyway."

B-Shift Supervisor Replied:

"It's tough having anyone off the floor for very long depending on the time of day and coverage. If you have enough people you can get some things done. We use to be able to have a dispatcher enter new GEO File data, but now in order to do that they have to hire them back on overtime…..it's just too busy now.

The fourth question asked was "Does routine training have a negative impact on the center's ability to operate?"

Senior Supervisor Replied:

"Yes, just like other projects it leaves us short staffed. Longer training always requires overtime behind someone."

A-Shift Supervisor Replied:

"Yes, sometimes it's a nightmare. You end up having to force behind that person."

B-Shift Supervisor Replied:

"Anytime we have required training we end up forcing people."

The comments of the supervisors surveyed in the ECC support the findings in the literature. The frequency of forced overtime has had a significant effect on the morale of the employees. According to those interviewed, the situation has resulted in a cycle where forced overtime of backfill just continues around and around. The effects on the Emergency Command Center have been negative.

4. What scheduling options exist to reduce forced backfill assignments and what other changes should be considered to ease the burden on these employees?

The research found that there are many options for shift configuration. These include 8-hour, 10-hour, 12-hour, and 24-hour shifts. Some centers also use a combination of these. The OCFA currently uses a combination of shifts. This includes 24-hour and 12-hour dispatchers. Of the seven dispatchers on duty each day, five work a 24-hours shift and two work a 12-hour shift. The intent of the 12-hour positions is to cover periods of high activity, commonly referred to as peak-load staffing. While this type of staffing met the needs of the OCFA for many years, a review of 9-1-1 calls per hour raises questions about the benefit of such a shift.

The 12-hours shifts cover two time periods. The first starts at 0700 hours (7 a.m.) and works until 2000 hours (8 p.m.) The second begins at 1200 hours (noon), and ends at 0100 hours (1 a.m.). These shifts were created to cover what was statistically the busiest periods of the day.

The activity levels after midnight were minimal. The chart below however reflects a change in this activity. This chart shows the number of calls in a given hour for the 2005 calendar year. The chart demonstrates that other than between the hours of 0100 hours (1 a.m.) and 0500 hours (5 a.m.) the call activity remains reasonably elevated. This has not always been the case. The 2004 chart reflects only half the call activity between these hours now experienced a year later.

Table 9 – 2004 9-1-1 Calls per hour

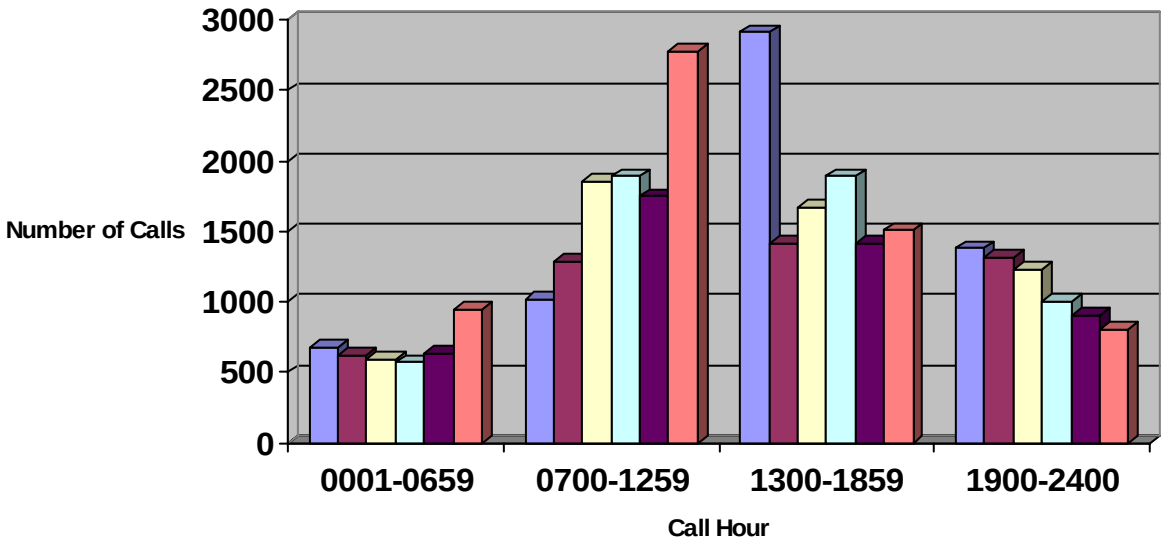
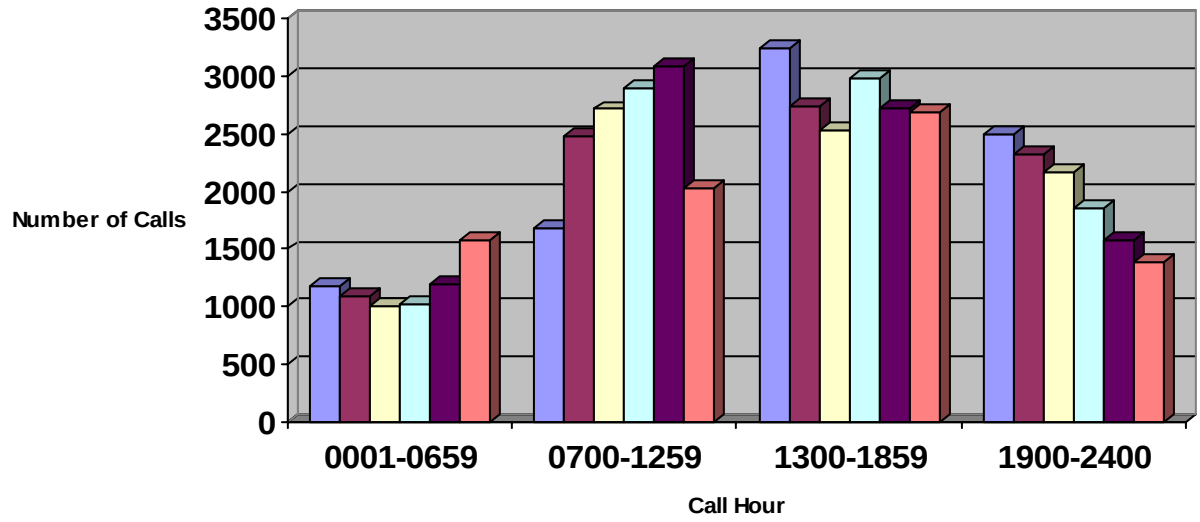


Table 10 – 2005 9-1-1 Calls per hour



Consistent with other data, the chart reflects an increase in call activity. For example, during the slowest hour, 0300 hours (3 a.m.), 2005 saw a seventy-one percent increase in 9-1-1 calls during this hour. Just as with the other data researched, the results in these charts reflect an increase in overall activity.

While the research found the 8-hour shift the most common schedule, the 24-hour shift is becoming more common, and more popular among fire departments. As the literature indicated, the longer shifts are much preferred by the employees. While the work shift may be longer, it provides longer opportunities for employees to spend time with families, and away from work allowing for longer rest periods. While the literature described these shifts to be more complex, the effort is worth the benefit. Not only do the shifts appear to be more attractive with dispatch employees, they also match those worked by firefighters. This can have organizational benefits as well. As a result of both dispatch and fire crews working together on a daily basis, professional relationships are developed and these can enhance operational effectiveness, and allow joint training with fire crews.

One of the biggest steps that can be taken to reduce forced backfill is to ensure that the communications center is fully staffed. Since the OCFA uses constant staffing, any vacant position automatically creates a demand for backfill. Keeping every position in the center filled can make a substantial difference in reducing forced backfill assignments.

Once a dispatch center is fully staffed, the next step in this process is keeping the staff you have. There needs to be an environment where the employees maintain a high level of involvement in the center's operation. This likelihood again will depend on adequate staff so that the employees are not burdened with routine work activities that there's no time for other stimulating and challenging assignments.

One other option that exists to ease the burden on the employees assigned to the OCFA Emergency Command Center is to increase the number of staff. The addition of a single employee on each shift can make a huge difference in employee stress and the quality of service that can be provided. In a busy center such at the OCFA's, adequate staff can make a difference in response times to incoming calls. The research already reflected a slight increase in the average 9-1-1 answering time. Additional staff can also improve service. By the dispatcher not having to disconnect with a 9-1-1 caller to answer another, additional assistance can be provided to the caller in the form of pre-arrival instructions, or simply reassurance during a time of crisis. This issue will be particularly critical if the OCFA decides to implement a tiered dispatching system where the dispatcher is required to stay on the line longer to obtain the needed information.

Discussion

The research clearly demonstrated that the staffing challenges faced by the OCFA Emergency Command Center are not uncommon among communications centers, both in the pubic safety sector, and private industry. The ability to staff the center in order to meet performance standard presents many challenges. According to research conducted by the Federal Railroad Administration (2004), determining optimal staffing levels is not an exact science. All the authors reviewed agreed that determining staffing levels is a challenge and as APCO (2005) states, filled with opportunities to make mistakes.

The study found that the performance benchmarks used by the OCFA to measure performance in the ECC are consistent with, if not actually more restrictive than those found in the research. NFPA Standard 1221 (1999) recognized thirty-seconds as the standard to answer 9-1-1 calls. Both APCO (2005) and the State of California (1997) recognize a standard of

answering 9-1-1 calls within ten seconds. The OCFA has established a much more challenging standard of answering a 9-1-1 call on the first ring which amounts to less than five seconds. While currently being reached, the study revealed that this standard is becoming more challenging to meet. In one year, the average answering time for 9-1-1 calls in the ECC increased from 3.36 seconds to 4.13 seconds. While a change of only .77 seconds, in this business, each second counts. The researcher is confident that this change can be attributed to the ever increasing workload of the center.

The study revealed several critical issues related to staffing communications centers, all of them consistent with the challenges facing the OCFA. These issues are vacancies in the center, and employee turnover. The study again demonstrated that these challenges are not isolated to public service. In a survey conducted by the Federal Railroad Administration (2004) it found that out of all six dispatch centers they surveyed, all of them were experiencing turnover issues. To address the turnover challenge, APCO (2005) confirmed that the most effective strategy a communication manager can use to improve overall center staffing challenges, including the retention of dispatchers is to ensure that all positions in the center are filled. The OCFA has consistently experienced vacancies in the ECC. This research found that these vacancies have directly contributed to the frequency of forced backfill in the center. During the last five years, the ECC has lost thirteen employees. Many of these are attributable to the high frequency of forced backfill.

Directly related to turnover and staffing challenges is one of the major issues affecting the ECC and that is the frequency of forced backfill. The study found a consistent increase in the number of forced backfill shifts over the past two years studied. In FY 2003/2004 there was an average of 11.9 shifts per person. This number jumped to 13.3 shifts per person in the following

fiscal year. This is a significant number considering the center is staffed with only twenty-two dispatch positions.

This high frequency of forced backfill has created a vicious cycle. According to personal interviews and research of leave use records, dispatchers are using sick leave and vacation in order to protect themselves from being subject to forced overtime, and they are using it at a high rate. Over ninety-five percent of the sick leave used by all ECC personnel has been used. In a survey conducted during this study, over seventy percent of the dispatchers who responded confirmed that they used both vacation and sick leave either for total, or partial shifts in order to protect themselves from forced backfill. Of those ninety-five percent who responded went on to state they would stop this practice if the likelihood of forced backfill significantly decreased.

One practice noted in the literature reviewed to address staffing shortages and turnover is hiring pro-actively, or what can be considered over hiring. While frowned upon by most public agencies, APCO believed that the benefits out weighed the costs. The researcher agrees with APCO. Historically the ECC has continuously played catch up in filling vacant positions. New employees are not hired until there are multiple vacancies due to the commitment in training. Over hiring would eliminate this problem.

Directly related to this cycle is the impact the high frequency of forced backfill has had on morale in the center. Many of the dispatchers have indicated a feeling of not belonging, or that management just doesn't care about them. As Cochrane (2005) describes, misery loves company. Dissatisfied people not only look for work elsewhere, but also have low productivity, generate more customer complaints, and have increased sick leave use, such as noted in the data. This increased level of forced backfill also has a significant financial price tag, over $400,000 in fiscal year 2004/2005; almost twelve percent of the entire salary budget for the ECC.

This study confirmed that the need for adequate staffing is more critical than ever. The ECC has seen a dramatic increase in workload over the past five years and in particular, the last two years. The OCFA and its service area continues to grow at a rapid pace. In 2004, the ECC handled a total of 154, 732 calls. This includes 32,046 9-1-1 calls. In 2005, this number made a dramatic increase jumping to 225, 377 calls; an increase of over forty-six percent. 9-1-1 calls for this same period also jumped by over sixty percent. However, the staffing levels have not increased since 2002.

While the research clearly demonstrated that there is no miracle answer to determine staffing needs for a center, the researcher utilized two different tools to estimate staffing requirements for the OCFA. As anticipated, both of the formulas used recommended an increase in the number of staff in the ECC. This proved true in both the number of call takers, and the overall staff level. Currently the ECC recognizes one call taker position. The results of the Erlang calculations recommended three call taker positions. Additionally, the basic calculation for the overall center recommended a total of thirty-two positions for the center when factoring in the turnover rate for the past 5 years. The ECC is currently authorized for twenty-two positions.

The results of the study clearly demonstrate the need to increase staffing in the Orange County Fire Authority Emergency Command Center. The data reviewed agrees with a question asked by the Association of Federal Government Employees (2004), “The practice of mandatory overtime begs the question of just how many consecutive hours can an employee be required to work and still perform their duties safely and effectively without posing risk to others?” There are circumstances were a dispatcher will work five consecutive 24-hour shifts. The use of forced overtime should be reserved for emergencies. Current staffing levels require the OCFA to rely on

mandatory overtime on a daily basis, and even more heavily during significant events or emergencies. Additional staffing will also permit the completion of special projects, training, and other activities without the need for forced backfill.

This involuntary overtime has had a negative impact on the ECC employees. The literature, the surveys, and personal interviews all confirmed this point. In addition to the problems of fatigue, the United Nurses of America (2003) also addressed the impact this overtime has on working families. This issue has directly impacted many of the dispatchers with the OCFA who have young children. Last minute forced overtime resulting from a co-worker calling in sick leaves them scrambling for childcare arrangements.

In summary, the findings and challenges created by the high frequency of forced backfill discovered in the study were not dramatically different from what the researcher anticipated discovering the literature review. However, one particular unanticipated finding in the data collection was the dramatic increase in workload in the ECC. After reviewing these findings, and in particular in looking at the workload data, it is the researcher's opinion that staffing changes in the OCFA Emergency Command Center are critical. The conditions really do beg the question, how long can they keep this up?

At the conclusion of this study, the researcher was truly able to relate and appreciate the words of Chief Thomas Wagoner of the Loveland Police Department, Loveland, CO (1994). Of dispatchers, Chief Wagoner wrote:

> "Someone once asked me if I thought that answering telephones for a living was a profession. I said, *"I thought it was a calling."*
>
> "And so is dispatching. I have found in my law enforcement career that dispatchers are the unsung heroes of pubic safety. They miss the excitement of riding in a speeding car

with lights flashing and sirens wailing. They do not get to see the joy on the face of worried parents as they see their child begin breathing on its own, after it has been given CPR .

Dispatchers sit in darkened rooms looking at computer screens and talking to voices from faces they never see. It's like reading a lot of books, but only half of each one. Dispatchers connect the anxious conversation of terrified victims, angry informants, suicidal citizens, and grouchy officers. They are the calming influence of all of them-the quiet, competent voices in the night that provide the pillars for the bridges of sanity and safety. They are expected to gather information from highly agitated people who can't remember where they live, what their name is, or what they just saw. And then, they are to calmly provide all that information to the officers, firefighters, or paramedics without error the first time and every time.

Dispatchers are expected to be able to do five things at once-and do them all well. While questioning a frantic caller, they must type the information into a computer, tip off another dispatcher, put another caller on hold, and listen to an officer run a plate for a parking problem….the rewards are inexpensive and infrequent, except for the satisfaction they feel at the end of a shift, for having done what they are expected to do."

Recommendations

The research in this study has more than clearly demonstrated the need for the Orange County Fire Authority to take action in correcting the staffing issue in their Emergency Command Center. Based on the literature review, research of internal statistical and financial data, surveys, and interviews, it is clear that the OCFA ECC is appreciably understaffed, and

negatively affected by the impacts of forced backfill. In order to correct this condition, the following recommendations are provided.

1. Hire twelve 24- hour full-time dispatchers and eliminate the four 12-hour full-time positions. While this is still short of the thirty-two positions recommended in by the formula used in the study. It will increase the number of 24-hour positions on each shift to nine, for a total of twenty-seven. This is close to the minimal recommendation in the staffing formula of twenty-eight positions which did not factor overtime. Considering the potential reduction of forced overtime this recommendation could have, the researcher believes that the issue of turnover would be significantly reduced. Given fluctuations in call volume, additional dispatchers could be assigned to work during the more active periods.

According to the OCFA Salary Table dated September 12, 2005, the approximate cost for these twelve positions, including benefits, and Emergency Medical Dispatching bonus is $1,166,340. This expense would be offset by the elimination of the four 12-hour full time positions. Based on the salary table, the estimated savings from the elimination of these positions would be $420,276. This will reduce the direct cost to $746,064.

2. Of the twelve 24-hour positions added, six would not be staffed by constant manning. This would provide each shift with a minimum staffing of seven 24-hour dispatchers, and nine when fully staffed. In addition to reducing the need for backfill behind employee leave, employees could also attend training, meetings, and assist with projects without the OCFA paying overtime. This would result in a significant decrease in annual backfill costs, one of the objectives of this applied research project, and could off-set the cost of the additional positions by an additional $250,000 per year. This would also significantly reduce the frequency of forced

backfill, the second objective of this project, since each shift would need to have two dispatchers off before overtime would be required, voluntary or forced.

3. Eliminate the three part-time positions. Currently only one persons in these positions is available to work. This creates a false sense of availability and does not relieve either the physical or financial burden of the forced backfill. Eliminating these positions would provide some minimal additional financial off-set to the cost of the added positions.

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Appendix A

Worksheet A: Determining Employee Availability

Determine Net Available Work Hours (NAWH)		
A	_____	Total hours for one full time employee
B	_____	Average vacation and holiday leave (total hours)
C	_____	Average sick leave (total hours)
D	_____	Average personal leave (total hours)
E	_____	Average training leave (total hours)
F	_____	Average military, FMLA, etc. leave (total hours)
G	_____	Average lunch and break (total hours)
H	_____	Average other (meetings) light duty, special assignments, etc)
I	_____	Total unavailable time = Total B through H
J	_____	Net Available Work Hours (NAWH) = A - I
	_____	Net Available Work Hours (NAWH) from J above

Appendix B

Worksheet B: Calculating Average Turnover Rate

	Calculate Average Turnover Rate	**Year**					
		2001	2002	2003	2004	2005	Average
A	Total number of employees at the highest staffing level fo that year						
B	Number of new hires that failed to complete the probation period						
C	Number of experienced employees who left.						
D	Turnover Rate (Turnover = B = C ÷ A)						
E	Retention Rate (Retention = 1 - Turnover) x 100						

Appendix C

Worksheet C: Calculating Staffing for Coverage Positions

Estimate Staffing Needed for Coverage Positions
Note: Coverage positions must be covered regardless of call volume of level of activity.
Position:
Hours needing coverage: A _____ Total number of consoles that need to be covered for this position. B _____ Number of hours per day that need to be covered. C _____ Number of days per week that need to be covered. D _____ Number of weeks per year that need to be covered. E _____ Total Hours needing coverage = A x B x C x D Employee Availability: F _____ Net Available Work Hours - enter average NAWH from worksheet A Staff Needed: G _____ Full Time Equivalent base estimate (FTE) = E ÷ F H _____ Turnover Rate - from retention worksheet, convert to decimal I _____ Full Time Equivalent required to accommodate turnover, prior to any adjustments based on quality indicators : FTE = G x (1 + H)
_____ = Estimated Staffing Need (in FTEs from Step I above)
FTE = Hours needing coverage ÷ Employee Availability x Turnover Adjustment

Orange County Fire Authority Appendix D-1

Battalion 5

MEMO

August 20, 2005

TO: All Fire Communications Dispatchers

FROM: Michael Boyle, Battalion Chief, Battalion 5-B

SUBJECT: Executive Fire Officer Program - Research Project Questionnaire

I am looking for your assistance. As many of you know, I recently started the Executive Fire Officer Program at the National Fire Academy. One of the requirements of the program is that we are required to complete an applied research project for each of the four classes. We'll I have picked a topic that is directly related to you their in the Emergency Command Center. The project investigates options for reducing forced backfill there in the ECC; something many of you and I have discussed in person. This issue is also identified in the department's Strategic Plan (Objective 3-B) which relates to ECC staffing levels.

I need for you to complete the attached questionnaire and return it to me in Battalion 5. I have included a self-addressed envelope for you to place in the department pony mail. The survey is confidential so there is no need to place your name on the survey or the envelope. This has been done so that you can feel comfortable in answering the questions without fear of any repercussions.

Thank you for you help. I appreciate your honest feedback.

Appendix D-2

EXECUTIVE FIRE OFFICER PROGRAM
APPLIED RESEARCH PROJECT
EMERGNECY COMMAND CENTER LEAVE USE QUESTIONNAIRE

1. Do you work more overtime than you wish?

   Yes _____ No _____

2. Do you believe the frequency in which you are subject to forced overtime has impacted your morale?

   Yes _____ No _____

   If yes, positively _____ negatively _____

3. Do you use sick leave for an entire shift to protect yourself from forced overtime the following day?

   Yes _____ No _____

4. Do you use sick leave to go home during a shift to protect yourself from forced overtime the following day?

   Yes _____ No _____

5. Do you use vacation time for an entire shift to protect yourself from forced overtime?

   Yes _____ No _____

6. Do you use vacation time for a portion of a shift to protect yourself from forced overtime?

   Yes _____ No _____

7. Would you stop using sick leave and vacation to protect yourself from forced overtime if the likelihood of forced overtime was significantly reduced?

   Yes _____ No _____ Not applicable _____